

**REMARKS**

**Pending Claims**

Claims 1-14 are pending. Claims 2 and 3 have been canceled. Claims 5-7 and 9-14 were amended in order to overcome the rejection under 35 U.S.C. §112.

Claim 2 was amended to include the features of claims 3 and 4 in order to overcome the rejection under 35 U.S.C. 112, and claims 3 and 4 were cancelled. A portion of original claim 2 was made into new independent claim 15, and dependent claims 16-18 were added.

**Claim Rejections - 35 USC §112**

Claims 2-7 and 12-14 have been rejected under 35 U.S.C. §112 as being non-enabling or being indefinite. Claims have been amended to overcome this rejection.

**Claim Rejections – 35 USC §103**

Claims 1 and 5-11 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Sakurai (USP6,309,738) or Kobe Steel (JP 11-61380) or Sumitomo Electric (JP 07-097679) in view of Hitachi Tool (JP 09-323205),

Sakurai (USP6,309,738) discloses a hard multi-layer coated tool in which individual or distinct layers of TiNC and individual or distinct layers of AlTiNC are alternately laminated.

Kobe Steel (JP 11-61380) discloses a wear-resistant multi-layer coating in which individual or distinct layers of TiAlN with low hardness (which contain relatively large amount of Al component and relatively small amount of Ti component) and individual or distinctive layers of TiAlN with high hardness (which contain relatively large amount of Ti component and relatively small amount of Al component) are alternately laminated.

Sumitomo Electric (JP 07-097679) discloses a ultra thin multi-layer structure in which individual or distinct layers of TiAlN (which contain relatively large amount of Al component and relatively small amount of Ti component), and individual or distinct layers of TiAlN (which contain relatively large amount of Ti component and relatively small amount of Al component), are alternately laminated. As shown in FIG. 3 of Sumitomo Electric, cutting inserts (substrates) 8 are mounted on the drum-shaped substrate carrier 7, and targets (TiN, AlN, TiAlN, etc.) are vaporized while being disposed in an opposing manner. Because the substrates 8 are mounted on and fixed to the surface of the substrate carrier 7, the vapor from a particular target (vapor source) is blocked by the substrate carrier 7 when one of the substrates 8 is located at a position opposite to the particular target. As a result of rotation of the substrate carrier 7, individual or distinct layers are formed on the substrate 8.

Hitachi Tool (JP 09-323205) discloses a hard multi-layer coated tool in which individual or distinct layers of TiAlN (which contain relatively large amount of Al component and relatively small amount of Ti component), and individual or distinct layers of TiAlN (which contain relatively large amount of Ti component and relatively small amount of Al component), are alternately laminated.

In contrast, in the surface-coated cutting tool member according to claim 1, a hard coating layer has a component composition profile in which maximum Al containing points and minimum Al containing points appear alternately and repeatedly at a predetermined interval in a direction of thickness of the hard coating layer, and the amount of contained Al component *continuously* varies from the maximum Al containing points to the minimum Al containing points and from the minimum Al containing points to the maximum Al containing points. In other words, the hard coating layer does not have individual or distinct layers. Because of the hard coating layer as described above, the cutting tool as set forth in claim 1 exhibits superior high temperature properties and strength, i.e., it has superior wear resistance during high speed cutting operations. This could not be attained by the cutting tool according to the combinations of the prior art references because all of them lack the feature of claim 1 as described above.

Because none of the prior art references discloses at least the particular feature set forth in claim 1 as described above, a person of ordinary skill in the art would not have been found obvious the present invention as set forth in claim 1.

In addition, in a method according to claim 8, a hard coating layer having overall average thickness of 1 to 15  $\mu\text{m}$  is formed, by a physical vapor deposition method, on the surface of the cutting tool being turned while rotating on the turntable about an axis of the cutting tool. In this case, the vapor from a particular target is *not* blocked by the turntable, and ions from the opposing targets are always mixed. As a result, the amount of contained Al component is *continuously* changed, and individual or distinct layers are *not* formed on the cutting tool substrate. Such features are not disclosed in any of the cited prior art references.

In conclusion, claims 1 and 5-11 of the present application would not have been obvious over Sakurai, Kobe Steel, or Sumitomo Electric in view of Hitachi Tool.

Claims 2-4 and 12-14 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Mitsubishi Materials (JP 11-310867) in view of Hitachi Tool (JP 09-323205).

Applicant respectfully submits that the prior art references cited above do not render the claims obvious for at least the following reasons.

Mitsubishi Materials (JP 11-310867) discloses a coated hard cutting tool having at least a TiAlN layer (or TiAlCN layer) exhibiting a particular X-ray diffraction pattern. This document is silent about a structure in which composition of a particular metallic component is continuously changed. That is, this reference also lacks the same feature as discussed above for claim 1.

Claim 2 has similar non-obvious features of claim 1, and therefore, these claims are not obvious for at least the same reasons as claim 1. Claim 2 has been amended incorporate a similar non-obvious feature of claim 1. Therefore, none of the references discloses, teaches, or suggests the invention as set forth in claim 2. Claim 2 would not have been obvious to a person of ordinary skill in the art.

Dependent claims 12-14 are also not obvious for at least the same reason as their base claim.  
Claims 3 and 4 have been canceled.

New Claims

New claims 15-18 contain the similar non-obvious features of claim 1. Therefore, these claims would not have been obvious for at least the same reasons as claim 1.

In view of the above amendment, applicant believes the pending application is in condition for allowance.

Dated: December 8, 2005

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